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 REASON 3 & 31

PROGRESS REPORTFORJUNE 1955ON4-INCH ROCKET20 July 1955

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Although most of the effort for June concerned preparation for the transfer of the project to Station No. 1, some static testing was done, a new type motor was designed, and a model was constructed for study.

A series of static tests was made to further study the relationship between pressure and K values. In this series the nozzle diameter was varied from 0.4375" to 0.468", which resulted in K values between 118 and 129, using 8" powder grains. The tests showed that as the K value was reduced to this comparatively low level, the average pressure was fairly constant, but the peak pressure dropped about 20%. This effect should lower the stress applied to the motor but should not affect the thrust to any great degree.

A static test was made of the Formica motor tube to be used in the newly designed motor. The tube, 12" long, was plugged at the head end, contained an 8" grain with an electric squib and booster, and had a conventional nozzle inserted at the tail end. Both the nozzle and plug were 1-1/2" long, were bonded in place with Bakelite Epon Resin, and in addition were retained with a Truarc retaining ring. The tube may be considered a complete motor in itself, since the pressure was contained within the tube. In the tests the tube was retained in a thrust socket and was supported by a metal framework. In each of several tests the motor performed as expected. Although the tube was free to move along its longitudinal axis, the thrust held the tube securely in the socket mounted on the thrust stand.

A preliminary model of the redesigned motor was constructed for study. This model has a one piece head in place of the separate head and cap formerly used. Basically, it is a four inch diameter motor, with six straight tubes, each employing a canted nozzle. Each tube was plugged at the head end, and a connecting hole was bored in the plug through the side wall of the tube. The tubes were then oriented in the head so that the bored holes connected to a central cavity and were bonded in place with Bakelite resin.

This motor possesses several advantages from a design standpoint. Since straight tubes are employed, the head can be made smaller. This, coupled with the elimination of the head bolts in the previous model, makes this unit much lighter. Of course, this would require less fuel and would result in smaller stresses on takeoff. The main benefit of this design is that the principal effect of pressure is confined within the tube, thereby greatly reducing the probability of tube blowout. In addition, since the pressurized areas of the head are quite small with the resultant small force acting on the head, it is possible that the entire head could be cast or molded with very little additional machining.

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Future Work

Plans for Station No. 1 include selection and familiarization of personnel for the project, selection of a static test area and liaison with the flight test area to determine the available range and scheduling. It is contemplated that work will begin within a week and that static tests of the redesigned motor will start as soon as a test area has been selected and instrumented.

Financial Statement

Total Amount of Contract (Phases 1 and 2)

Expenditures for June 1955

Total Expenditures to 30 June 1955

Balance of Contract



50X1

Expiration Date - 1 November 1955

Handwritten signature and date: 8/10/55